

NON-PUBLIC?: N
ACCESSION #: 8801120343

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Nine Mile Point Unit 1 PAGE: 1 of 5

DOCKET NUMBER: 05000220

TITLE: Automatic Reactor Scram On Low Reactor Water Level Due To Feedwater
Flow Control Valve Problems

EVENT DATE: 12/07/87 LER #: 87-024-00 REPORT DATE: 01/06/88

OPERATING MODE: N POWER LEVEL: 095

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Peter A. Mazzaferro, Assistant Supervisor, Technical Support

TELEPHONE #: 315-349-2190

COMPONENT FAILURE DESCRIPTION:

CAUSE: B SYSTEM: SJ COMPONENT: FC0 MANUFACTURER: F127

REPORTABLE TO NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On December 6, 1987, at approximately 2100 hours, Operations personnel at Nine Mile Point Unit 1 (NMP1) observed that the reactor feedwater flow control system began to develop an instability. Attempts were made to dampen the resulting reactor water level oscillations by taking local manual control of a feedwater flow control valve. However, these attempts were unsuccessful and the reactor scrambled at 0054 hours on December 7, when the water level fell to the low level scram setpoint. The High Pressure Coolant Injection mode of feedwater also initiated and reactor water level was subsequently restored to normal level.

The probable root cause of this event was debris in the instrument air control line to the feedwater flow control valves #13 North and South and #11 valve positioners. A secondary cause of this event was the fact that the feedwater master controller was out of adjustment. This prevented the flow control valves from responding properly to signals from the feedwater control system.

Corrective actions consisted of issuing station Work Requests to repair the feedwater control malfunction, recalibrating the feedwater master controller and initiating a Modification Request to install inline filters on the instrument air supply to the Feedwater Flow Control Valves.

(End of Abstract)

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DESCRIPTION OF THE EVENT

On December 6, 1987, at approximately 2100 hours, Operations personnel at Nine Mile Point Unit 1 (NMP1) observed that the reactor feedwater flow control system began to develop an instability. At this time, NMP1 was operating at 1780 Mwt (96%) with reactor water level being maintained at approximately 78 inches. Feedwater was being supplied as shown in figure 1, by FCV #13 North, FCV #13 South and FCV #11. The two valves #13 North and #13 South in parallel control the flow from feedwater pump #13, which provides 80% of all feedwater flow at rated power. Approximately 20% of the feedwater flow was being supplied by #11 feedwater pump with FCV #11 in manual. At 2300 hours, Operations personnel observed that the oscillations (only FCV #13 North was oscillating) in the reactor water level had increased to a magnitude of nearly five (5) inches in a normal level control band of 18 inches. In an effort to dampen the oscillations, Operations personnel attempted to take local manual control of Feedwater Flow Control Valve (FCV) #13 North by applying the manual blocking collar and let FCV #13 South control flow automatically. (FCV #13 South was not oscillating and it was not realized at the time, that FCV #13 South could not respond.) As manual control of FCV #13 North was taken, the reactor water level began to decrease since FCV #13 South could not respond to automatic signals. The collar was then removed and automatic feedwater control began to restore the reactor water level with FCV #13 North. Water level then increased to approximately 82 inches. Operations personnel again placed the manual blocking collar onto FCV #13 North in an effort to dampen the instability in the Feedwater Control System. With #13 FCV South unable to respond and #13 FCV North and FCV #11 in manual control, automatic control of feedwater flow to compensate for a reactor water decrease did not function properly. This resulted in a further reduction in feedwater flow and a corresponding decrease in reactor water level. As the manual blocking collar was removed this time, FCV #13 North did not open fast enough and the reactor water level continued to fall. At approximately 0054:49 hours on December 7, 1987, the reactor water level fell to 53 inches, initiating a scram. At this time, the High Pressure Coolant Injection (HPCI) mode of feedwater also initiated on low reactor water level, returning the reactor water level to normal at approximately 0056 hours.

Turbine trip occurred at 0054:54 hours, 5 seconds after the scram and the generator tripped on reverse current 4 seconds after the turbine trip. These events occurred as designed and the systems functioned properly.

Shortly after the scram, there was a significant increase in #13 feedwater pump flow. This corresponded to a field observation that #13 FCV South suddenly and rapidly opened, indicating that #13 FCV South was stuck until after the scram. This caused a correspondingly rapid recovery in reactor water level. At 0055:15 as reactor water level returned to a near normal range, the Chief Shift Operator tripped the #13 feedwater pump. This occurred momentarily before the reactor water reached 66 inches. It was also observed by Operations personnel, that feedwater flow control valve #11 was not fully closing upon the appropriate signal. This contributed to the higher than normal return of reactor water level. Approximately one minute later at 0056:44, both motor driven feedwater pumps tripped automatically on a high reactor water level of 95 inches.

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CAUSE OF THE EVENT

The probable root cause of this event was due to debris that had entered into the positioners of feedwater flow control valves #13 North and South. Inspection of the valves after the scram revealed that scale had

accumulated in the instrument air lines. This caused the FCVs #13 North and South to become unstable in their response to the Feedwater Flow Control System and FCV #11 to not fully close upon the appropriate signal. This resulted in the loss of control of reactor water level.

A secondary cause of this event was the fact that the feedwater master controller was out of adjustment at the time the described events were taking place. Inspection after the event by Instrumentation and Control personnel revealed that the feedwater master controller Reset control time was too long. The reset control was found to be at 1.2 and should have been at 0.5. The proportional band was found to be at 100 and should have been at 70. The control circuitry with these settings out of adjustment will retard the time that it takes for the controller to return to the set point. This prevented the feedwater control from responding as fast as it could have during this event.

ANALYSIS OF THE EVENT

This event is considered reportable in accordance with 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor

Protection System (RPS). However, actuation of an ESF, including the RPS, that resulted from and was part of the preplanned sequence during testing or reactor operation need not be reported.

The consequences of the feedwater flow control valve problems described in this report are bounded by a feedwater controller malfunction (zero demand). This latter transient was previously analyzed and a summary is presented in the NMP1 Final Safety Analysis Report, Section XV "Safety Analysis".

The event described in this LER parallels the analysis in the FSAR but is less severe since all sources of feedwater supply were not lost. Feedwater from the motor-driven pumps #11 and #12 was available and used as required by design, and the reactor power at the time of the event was 95%. Thus in consideration of the ramifications of this event, no adverse safety consequences resulted, and this event did not at any time compromise the safety of the station, of station personnel or the health of the general public.

CORRECTIVE ACTION

Corrective action consisted of initiating station Work Requests #132200 and #132301. After inspection of the valves, the air lines were blown free of the debris. WR #132200 was issued to trouble shoot the Flow Control Valves #13 (North and South) control circuitry. WR #132301 was issued to check the valve position of Flow Control Valve #11.

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CORRECTIVE ACTION (Cont'd)

Instrument and Control procedure ICP-C-FWC-4 (Feedwater System, Pump Valve Control And Sequencing) was performed to recalibrate the feedwater master controller. The Reset knob was set to 0.5 and the Proportional Band was set to 70. In addition, the Instrument and Control Department has initiated a site Modification Request # N1Y87MX090 to install inline air filters on the instrument air supply for Feedwater Flow Control valves #11, #12 and #13 North and South.

Following the corrective actions, with the exception of the installation of the inline air filters, the feedwater system functioned properly and was returned to service.

ADDITIONAL INFORMATION

FAILED COMPONENT SYSTEM COMPONENT MANUFACTURER

Fisher 3570 Valve
Positioner SJ FCO F127

The following is a list of previous NMP1 events in which feedwater air supply and controller related problems caused scrams.

EVENT DATE TITLE

November 3, 1969 Feedwater controller malfunction.

August 8, 1970 Reactor low level trip caused by disturbance of the feedwater control system during surveillance testing.

August 18, 1971 Low water level due to air relay failure in #13 shaft pump north flow control valve.

December 9, 1974 Feedwater control valve air relay failure caused low reactor water level.

January 18, 1975 Reactor high water level due to feedwater control malfunction.

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FIGURE 1
FIGURE OMITTED - NOT KEYABLE (FIGURE)

ATTACHMENT # 1 TO ANO # 8801120343 PAGE: 1 of 1

NIAGARA MOHAWK POWER CORPORATION
NIAGARA MOHAWK
301 PLAINFIELD ROAD
SYRACUSE, NY 13212

THOMAS E. LEMPGES NMP 30291
VICE PRESIDENT-NUCLEAR GENERATION

January 6, 1988

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

RE: Docket No. 50-220
LER 87-24

Gentlemen:

In accordance with 10 CFR 50.73, we hereby submit the following Licensee Event Report:

LER 87-24 Which is being submitted in accordance with 10 CFR 50.73(a)(2)(iv), "Any event or conditon that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS). However, actuation of an ESF, including the RPS, that resulted from and was part of the preplanned sequence during testing or reactor operation need not be reported."

A 10 CFR 50.72 report was made at 01:50 on December 7, 1987.

This report was completed in the format designated in NUREG-1022, Supplement 2, dated September 1985.

Very truly yours,
/s/ Thomas E. Lempges
Thomas E. Lempges
Vice President
Nuclear Generation

TEL/meh
Attachment
cc: William T. Russell
Regional Administrator

*** END OF DOCUMENT ***
